User’s Manual for Bending Presses

User’s Manual (MU)
User Documentation

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Notes

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The chronological list of editions of this document is given in the following table:

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END OF SUMMARY

Notes for the reader

General information

The information in this manual only applies to the software versions indicated on the frontispiece.

Not all the available functions may be described in this manual. In these cases, Esa/Gv shall be obliged to neither guarantee these functions nor include them in future versions.

Purpose

The purpose of this document is to help the operator when using the product described on the frontispiece.

Users

This document contains information for:

- machine operators with no basic knowledge about computers.

Use of the document

The document is divided into chapters that describe a well defined function of the operator interface.

Notification of difficulties

Please contact Esa/Gv if any difficulties should arise when this manual is used.

Explanation of the symbols

Graphic symbols may appear beside the text. These are used to emphasize information of particular importance.

Attention
This symbol is used when failure to take the appropriate precautions **could cause slight damage to persons and property**.

Danger
This symbol appears when failure to take the appropriate precautions or accomplishment of incorrect manoeuvres **could cause serious damage to persons and/or property**.

Important
This symbol appears in the manual to indicate information of particular importance. It is essential to read these sections in order to fully understand the manual.

Printer's conventions

Particular printer's conventions are used to make it easier to identify the information in this manual. These conventions are illustrated below.

Keyboard and video

The following conventions are used.

- The names of the screen-printed keys are indicated in **boldface** and are enclosed within square brackets. If the name of the key is preceded by "button", reference is being made to a key on the push button panel.
  - **[ENTER]**. Identifies the key that bears the word ENTER.
  - **[+]** indicates the + key of the keyboard, while button **[+]** indicates the + key of the push button panel.
- The names of the function keys are indicated in ***boldface italics*** and are enclosed within square brackets.
  - **[*Plc Menu*]**. Identifies the function key that bears the words Plc Menu.
- References to fields and/or messages on the video are written in ***boldface italics***.
- The specific text to be digitized by the user is <u>underlined</u>.
  - If the manual indicates "digitize <u>ok</u>, the user must digitize exactly "ok".
- DIRECTION or DIRECTIONAL keys is the collective name used to indicate the UP, DOWN, LEFT and RIGHT keys.
- Pressure, in sequence, on a series of keys is written by separating the identifiers of the required keys with the ">" character.
  - **[*Manual*]** > **[START]**. Describes pressure, in sequence, on the **[*Manual*]** and **[START]** keys.
- Pressure on several keys at the same time is indicated by separating the identifiers of the keys themselves with the "+" character.
  - **[SHIFT]** + **[→]** Describes contemporaneous pressure on the **[SHIFT]** and **[→]** keys.

Text

The following conventions are used.

- *Italics* are used to identify specialistic terms.
- **Boldface** is used to emphasize words of particular importance.

END OF PREFACE

1 Introduction

1.1 General features

- Positioner with one or two absolute two-way axes. Each axis can be disabled.
- Type of axis that can be selected: proportional (“DC”) or with up to 2 speeds (“AC”).
- 16-character alphanumerical liquid crystal display.
- Keyboard with 18 keys. numeric, start/stop and manual.
- Max: 32 I/O module 8 configurable as inputs or outputs.
- Inputs via incremental rotary encoder or optic line.
- Buffer battery: memorized data retained for up to 3 years from last switch-off.
- E2PROM management to save machine parameters.
- Memory: 99 cycles for 99 programs, max. 1000 programs.
- Manual, semiautomatic and automatic operation with dedicated machine cycle.
- Manual and automatic sizing.
- Check-control functions on machine.
- Automatic play adjustment with adjustable play adjustment.
- Tolerance checks, with error range selection.
- X axis deviation function.
- Operation in either millimeters or inches.

1.2 Front panel

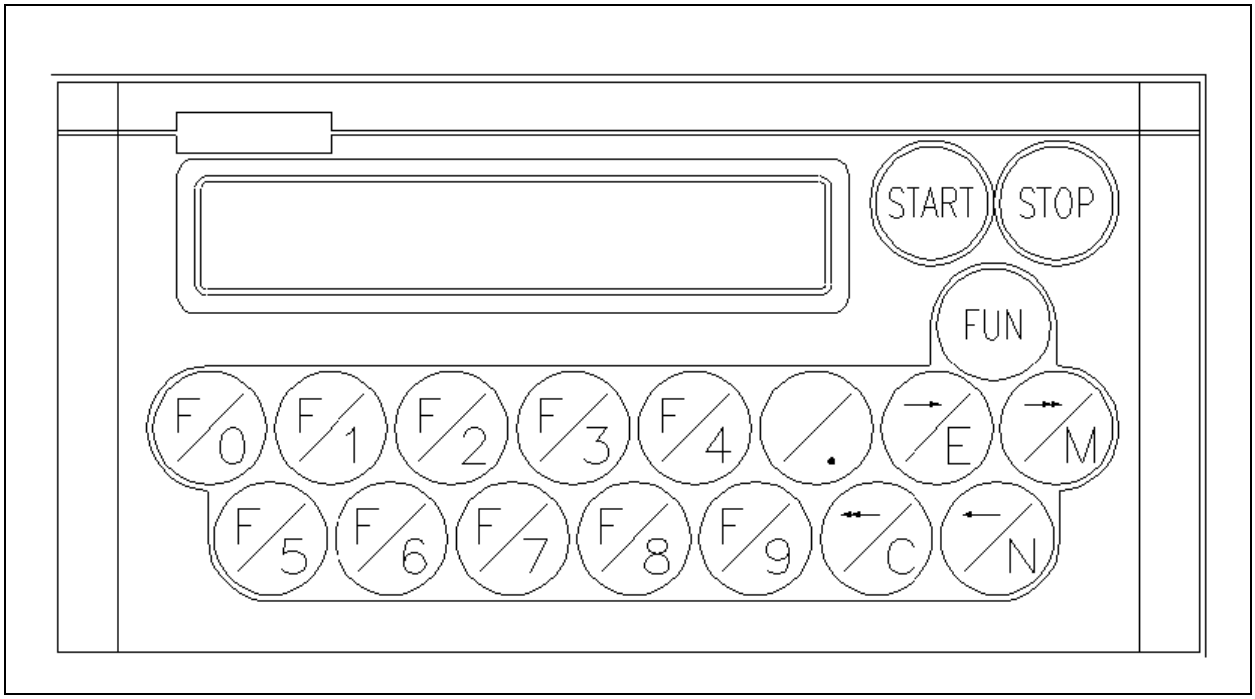


Figure 1.1 - Front panel of TRIA250

The panel consists of:

- Alphanumerical display with 16 characters.
- Numerical/functional keyboard with 16 keys.
- START button.
- STOP button.

2 Powering the Numeric Control

If there are no error messages, the numeric control displays the following message when powered:

Basic Menu

The operating logic of the numeric control is handled by means of machines statuses or functions. Each function identifies a particular way of operating the numeric control.
The required function is selected by pressing keys **[*F/0*]** to **[*F/9*]** but only when the basic menu appears on the display.
There are 10 functions and each is indicated by code “F0” ... “F9” which appears at all instants on the left-hand side of the display.
Once the operating mode has been selected, the operator will be able to select any of the operations identified and allowed by the machine status itself.
The functions are:

- **[*F/0*]** Machine parameters
- **[*F/1*]** Cycle reading/writing.
- **[*F/2*]** Not used.
- **[*F/3*]** Manual operation.
- **[*F/4*]** Semiautomatic operation.
- **[*F/5*]** Automatic operation.
- **[*F/6*]** Not used.
- **[*F/7*]** Test.
- **[*F/8*]** Semiautomatic operation 2.
- **[*F/9*]** Sizing.

2.1 Software version

When the basic menu is displayed, press **[.]** to display the software version installed in the numeric control:

```
SW.0250.067.000
```

Software version

Always refer to this code if assistance is required.
Press **[*FUN*]** to return to the basic menu.

2.2 Messages on powering

When powered, the numeric control proceeds with a "check-control" phase during which it checks for errors in the memorized values. Errors could occur owing to a sudden voltage drop when critical operations are carried out, e.g. a blackout during axis movement. In these cases, the following messages may appear when the numeric control is powered:

- **P.Fail func. F3**: Indicates that there has been a blackout during axis movement in the Manual mode.
- **P.Fail func. F4**: Indicates that there has been a blackout during axis movement in the Semiautomatic mode.
- **P.Fail Cyc n xx**: Indicates that there has been a blackout during axis movement in the Automatic mode; also indicates the cycle that was being carried out (xx).
- **P.Fail func. F9**: Indicates that there has been a blackout during axis movement in the Sizing mode.
- **ERR. PARAM**: Indicates that there are errors in the machine parameters. In this case, the axis cannot be moved in the Manual, Semiautomatic, Automatic or Sizing functions. Correct values must be entered for these parameters in order to operate.
- **CHECK ALL VALUES**: Indicates that the memory of the numeric control contains incorrect values. This may happen when the numeric control is powered for the first time and the memory has not yet been formatted, and/or if sizing has not been carried out. If the problem persists whenever the numeric control is powered, it could mean that the internal battery used to maintain the data in the internal memory is faulty. Contact the assistance service in this case. However, the axes must be sized and the cycle memory initialized when this message appears.

The first message appears on the display. If there are others, they can be displayed by pressing **[*FUN*]**] in succession until the basic menu appears again.

Important
If a blackout occurs, the axis will need to be sized again before the numeric control can be used again.

3 Machine parameters

Before the numeric control can be used, it will be necessary to memorize a sequence of parameters, i.e. a set of values that refer to the physical mechanical characteristics of the machine in question.

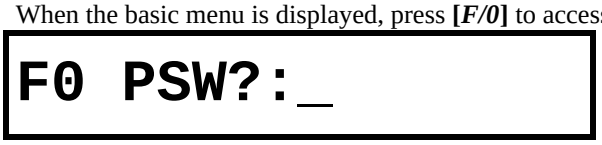
All the parameters can be displayed and can thus be modified after a password has been entered.

The parameters are memorized in a storage device that does not require a battery to maintain the data in the absence of electricity.

The following groups of parameters are available:

- machine configuration or single parameters
- axes parameters (a group for each axis)
- parameters for “DC” axes (these are only displayed in relation to axis configuration and there is a group for each axis.
- parameters for “AC” axes (these are only displayed in relation to axis configuration and there is a group for each axis.

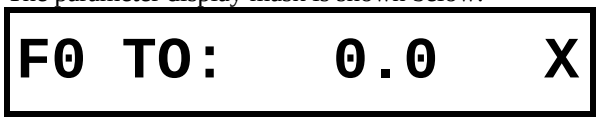
When the basic menu is displayed, press **[*F/0*]** to access the parameters mask:



Password

The first axis parameter of the first axis configured can be accessed once the correct password has been digitized (see password N° 2 in the relative chapter).

The parameter display mask is shown below:



Parameter display

Each parameter consists of:

- alphanumerical identifier code (generally 2 characters or more)
- value of the parameter (these can be integers, decimals or represented by an alphanumerical code)
- the code that identifies the axis (an alphabetical character, only for parameters concerning axes. Not for single parameters).

These are the keys enabled in the parameters mask:

[M] selects the next parameter, or confirms the new value entered if a set-up phase is activated

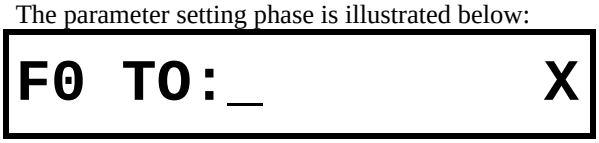
[E] selects the previous parameter if a set-up phase is not activated.

[N] if a set-up phase is not activated, allows the first of the single parameters to be displayed, otherwise it allows a negative value to be entered (only if no value has yet been entered).

[C] for certain parameters, allows the possible tolerated values for that parameter to be selected, otherwise it allows the value to be cancelled so that a new one can be entered.

[*FUN*] quits the function or, in the set-up phase, allows the previous value to be restored.

The parameter setting phase is illustrated below:



Parameter entry phase

This is the sequence in which the parameters are displayed as soon as the operator accesses this function. The values displayed obviously depend on whether the axis has been configured.

- X axis parameters
- X axis parameters in DC or X axis parameters in AC
- A axis parameters
- A axis parameters in DC or A axis parameters in AC

3.1 Single parameters

TYAX_X allows the X axis configuration to be selected. Press **[C]** to select the available values:

- DC = proportional axis handled in closed loop mode
- AC = axis with 1 or 2 speeds handled in the open loop mode
- OFF = axis disabled

TYAX_A allows the A axis configuration to be selected. Press **[C]** to select the available values:

- DC = proportional axis handled in closed loop mode
- AC = axis with 1 or 2 speeds handled in the open loop mode
- OFF = axis disabled

UN_MIS allows the required unit of measurement to be selected. Press **[C]** to select the available values:

- MM = millimeters (1 or 2 decimals can be selected for the targets, depending on the “RE” axis parameter).
- INCH = inches (2 or 3 decimals can be selected for the targets, depending on the “RE” axis parameter)

MOV_TAR allows the first direction of the movement required to find the SIZING input during the A axis automatic sizing phase to be selected (see relative chapter). Press **[C]** to select the available values:

- BACK = reverse direction (towards zero)
- FWD = forward direction

MODE allows function F8-SEMIAUTOMATIC 2 to be enabled or disabled and to handle A axis’s return to zero (see description in the Manual, Semiautomatic and Automatic chapters). Press **[C]** to select the available values:

- TYP.1 = function disabled
- TYP.2 = function enabled + management of the return to zero of A axis

SC_TYPE allows deviation management to be enabled or disabled. Press **[C]** to select the available values:

- OFF = deviation disabled
- ON = deviation enabled

SIMUL This parameter allows the encoder count to be simulated on the bench and to thus test the operation in the various movement statuses (manual, semiautomatic, automatic). **Enter value 250 to activate the simulation mode but only in the above mentioned case**.

3.2 Axes parameters

These parameters can always be displayed, regardless of the type of axis selected (unless both axes are disabled).

TO	Determines the positioning error range (see “Notes about positioning” chapter). Value given in the utilized unit of measurement.
MX	Maximum absolute positioning target. Value given in the utilized unit of measurement.
MN	Minimum absolute positioning target. Also accepts negative values. Value given in the utilized unit of measurement.
RG	Type of play adjustment to which all types of positioning must be subjected. Enter value 1 for play adjustment on closing (forwards-backwards), 2 on opening (backwards-forwards) and 0 for no type.
QG	Overtravel target for play adjustment. Value given in the utilized unit of measurement.
AP	Overtravel target for opening (see “Notes about positioning” chapter). Value given in the utilized unit of measurement.
SC	Deviation target (only of significance for X axis). Value given in the utilized unit of measurement.
PR	Sizing target (only of significance for A axis). Used for the A axis automatic sizing procedure (see relative chapter). Value given in the utilized unit of measurement.
TT	Waiting time at the end of positioning to allow the axis to reach the required target correctly. Value given in seconds.
TI	Waiting time for all movement reversals. Value given in seconds.
TA	Delay in starting the return of A axis to the basic position (see ZA parameter). In the automatic and semiautomatic modes, this time is waited at the end of positioning to the target established by the current program step, before automatic return to the basic position of A axis. Value given in seconds. Only of significance for A axis.
ZA	This is the start and return position of A axis (also called BASIC) in the automatic and semiautomatic modes. The A axis end of positioning output is activated when the axis is positioned at this target (within the set tolerance limits) in the manual, automatic and semiautomatic modes. Only of significance for A axis. Value given in the utilized unit of measurement.

FC determines the correspondence between one pulse of the counting device and the minimum unit of measurement (tenth or hundredth of a millimeter). This parameter is a pure number.

For example, the calculation can be made in the following way:

$$FC = \frac{(\text{number of pulses per encoder turn})*MU}{(\text{linear development of an encoder turn in tenths or hundredths of a millimeter})}$$

MU Establishes the multiplication factor of the counting pulses on the input. This parameter is a pure number and can have the following values: 1, 2, 3, 4.

RE Defines the count resolution, which can be the tenth of a millimeter (“Dmm”) or the hundredth of a millimeter (“Cmm”). Press **[C]** alternatively to select the available values:

3.3 Parameters for “DC” axes only

The values are only displayed if the axis has been configured as “DC”.

VM	Gives the upper speed limit for the axis (machining speed). All speed parameters are always limited to this value even when a higher value is entered. The acceleration and deceleration ramps always refer to this speed. Value given in meters per minute.
H3	Gives the maximum speed with which the movement must be made in the manual function **[*F3*]** when fast movement is enabled. Value given in meters per minute.
L3	Gives the minimum speed with which the movement must be made in the manual function **[*F3*]** when slow movement is enabled. Value given in meters per minute.
VP	Gives the speed with which the COVER/SIZING input is searched during the automatic axis sizing phase. Value given in meters per minute. Only of significance for A axis.
TY	Establishes whether the analog axis is piloted with -10, +10 Volts (select value 0) or with 0,+10 Volts plus an output to define the direction of movement (1 output ON with FORWARD direction, 2 output ON with BACKWARD direction).
AC	Defines the time within which the axis can move from zero to maximum speed during the positionings. Value given in seconds.
DE	Defines the time within which the axis can move from maximum speed to zero during the positionings. Value given in seconds.
DA	Defines the time within which the axis can move from maximum speed to zero during an alarm procedure. Value given in seconds.
GA	Defines the position gain of the axis. This parameter is a pure number.
OF	Defines the offset correction. Value given in Volts.
IN	Defines the negative insensitivity limit for the axis minus the section near the origin, of the characteristic curve in which it is insensitive. Value given in Volts.
IP	Defines the positive insensitivity limit for the axis minus the section near the origin, of the characteristic curve in which it is insensitive. Value given in Volts.
MC	Establishes whether the axis must also be kept torqued when it is not carrying out a positioning (value 1), or not (value 0). An axis is torqued when voltage is supplied to the motor and the brake is disengaged (if any).

3.4 Parameters for “AC” axes only

The values are only displayed if the axis has been configured as “AC”.

IA	Inertia correction target. Advances the stop point of the value programmed during forward positionings.
II	Inertia correction target. Advances the stop point of the value programmed during backward positionings.
LI	Distance required to change from fast to slow during backward positionings. Enter zero for this value to configure a one-speed axis.

4 Cycle Writing

This function allows you to program 99 cycles, each of which formed by a maximum 99 programs or “steps”.
Remember that the maximum number of programs is **1000**.

The cycles can be programmed in random order. This means that programming can begin from any cycle. The steps must be written in increasing order.

A cycle consists of:

- X axis absolute positioning target plus a possible DEVIATION function.
- A axis absolute positioning target.

This function cannot be accessed in the following cases:

- both axes disabled

The last cycle edited in this function is displayed when this function is accessed:

Cycle number selection

Important
In this chapter, it is assumed that both axes and the deviation function are enabled. If the axis is not enabled, none of the parameters and values concerning it will be displayed or handled. Deviation will not be handled if X axis is disabled.

4.1 Memory deletion

It is advisable to delete the entire memory reserved for machining cycles when the numeric control is installed for the first time or whenever the message “CHECK ALL VALUES” appears on powering. When this mask appears, select the cycle number and press **[.]**:

Request to delete the memory (or not)

Confirm deletion with **[M]**] or press **[*FUN*]** to abort the operation.

Once deletion has been confirmed, the numeric control will request the Password (see password number 1 in the relative chapter).

The following message will appear if the password is correct:

Memory deleted

4.2 How to program a cycle step

When the mask appears, select the cycle number and press **[M]** to confirm that cycle. Press **[C]** to select a new cycle from 1 to 99.

The first parameter of the first step will be displayed if the selected cycle is already memorized, otherwise the cursor will flash while waiting for the value to be entered.

In this case:

```
F1 1 _          X
```

X axis target entry

After the X axis target has been entered (if the value is beyond the axis limits, it will not be accepted), press **[M]** to automatically move on to the request to associate the deviation or not:

```
F1 1  100.0 _ X
```

Waiting for the deviation to be entered

Press **[.]** to enable the deviation function (or not). the “s” character will appear if the deviation has been entered:

```
F1 1  100.0 _sX
```

Deviation enabled

Press **[M]** to continue. Entry of the A axis target is requested in this case:

```
F1 1 _          A
```

A axis target entry

Once the axis target has been entered (in the utilized unit of measurement), the numeric control will wait for cycle step number 1 to be entered.

4.2.1 How to enter a new step

Press key **[*F/7*]** or **[*F/8*]** to continue with program entry.
To enter a step after the displayed one, press **[*F/7*]**. To enter a step before the displayed one press **[*F/8*]**. The entry procedure is the same as the one described previously.

4.3 Utility

The functions described below will be available as soon as at least one cycle step has been written. These functions CANNOT be used if the set-up is activated.

4.3.1 Reading steps in sequence

Press **[N]** to read the various cycle steps in sequence. The targets of the first axis enabled will be presented.

4.3.2 Step data reading

Once the step has been selected, press **[M]** to alternatively display the targets of that step.

4.3.3 Step data correction

Once the step has been selected, press **[C]** to enter a new value for the selected data item.
For the deviation function, select the mask where it is displayed and press **[.]** in succession to enable or disable the deviation function.

4.3.4 Direct selection of a step

If the cycle consists of lots of steps, move to the required one by pressing **[*F/6*]:**

```
F1 STP N_
```

Direct selection of a cycle step

Enter a value between 1 and 99 followed by **[M]**. The following message appears if the entered value fails to correspond to an already written program:

```
F1 STP N ERROR
```

Incorrect cycle step selection

Press **[*FUN*]** to quit this status.

Otherwise, the following message appears if the selected program has already been memorized.

4.3.5 Cycle step deletion

Press **[*F/9*]** in the display status to delete the entire step displayed.

Warning
Deletion occurs without any confirmation being required.

4.3.6 Single cycle deletion

Press **[E]** to delete the entire cycle displayed.

Single cycle deletion

Press **[*FUN*]** to abort the operation, or **[M]** to confirm it. The cycle will be deleted automatically.

This message indicates that deletion has taken place:

Cycle deleted

Press **[*FUN*]** to quit this status.

4.4 Autolearning axes targets

In this function, the X and A axis targets can be autolearnt in the program selected at that moment.

This operation can be carried out with the **[STOP]** key when the numeric control is in the X or A target entry, correction or display mode.

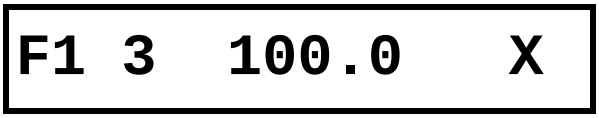
For example, supposing that the cycle has not yet been written and that the numeric control is in this situation:

X axis target entry

The X target can be entered with the previously described procedure or **[STOP]** can be pressed to automatically autolearn the current target of X axis as X target of program number 1. The same procedure also applies to A axis.

Another situation that may occur is to autolearn a target in an already written program. Supposing that you want to autolearn in program number 3.

The following message could appear on the display:



Press [**[STOP]** to automatically autolearn the target of X axis as X axis positioning target for program number 3 and immediately display it.

Warning
If the target is not autolearnt, this means that the current target of the axis is beyond the minimum and maximum limits of the axis itself.

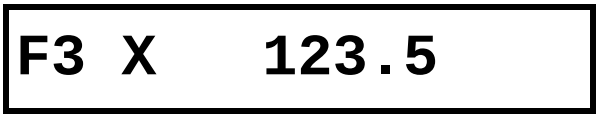
5 Manual mode

This function allows you to move both the axes with the direction keys, but not at the same time.
In this function, the machine must also be able to bend, thus the end of positioning outputs will be activated.

This function cannot be accessed in the following cases:

- parameter errors
- both axes disabled

Press **[*F/3*]** from the basic menu to display the current target of "X" axis if this has been configured, otherwise the target of "A" axis will appear:



Current "X" axis target

The axis target is given in the utilized unit of measurement.

Press **[.]** in succession to switch from one axis to the other.

Once the axis has been selected, press the direction keys to move it in the following modes:

- [->>] FAST FORWARD.
- [->] FAST FORWARD.
- [<<-] FAST BACK.
- [<-] SLOW BACK.

If the axis has been configured for one speed, the FAST and SLOW keys will have the same effect.

5.1 Operation with single parameter MODE=TYP.1

The END OF POSITIONING signal of the moving axis is deactivated during the movement phase of either one of the two axes. The signal is re-activated at the end of the movement.

5.2 Operation with single parameter MODE=TYP.2

If an “A” axis positioning has been interrupted in the automatic or semiautomatic modes, only movement in the MANUAL SLOW mode will be possible until “A” axis returns to the BASIC position (axis parameter “ZA”).

The END OF POSITIONING signal of the moving axis is deactivated during the movement phase of either one of the two axes. The signal is re-activated for “X” axis at the end of the movement and for “A” axis only if, at the end of positioning, the axis is in the BASIC position within the tolerance limits.

6 Notes about positioning

6.1 Type of positioning

This numeric control can only make positionings of the absolute type.
When an absolute target is entered, it means the target at which the axis positions in relation to the zero mark after having received the START enabling signal. The positioning target can be either positive or negative.
If, at the moment START is enabled, the axis is already within the tolerance limit, it will not be positioned.

6.2 Direction

Movement is two-way, i.e. the axis can move in both directions. FORWARDS means movements towards increasing values.

6.3 Positioning opening

Only if the axis is configured as “AC” will the numeric control make an overtravel to a preset target (axis parameter “AP”) each time a positioning less that the inertia target must be carried out, after which it will return to the stop position in a similar way to play adjustment.

This situation may occur automatically when an off-tolerance positioning is corrected.

If the maximum or minimum limits are exceeded during an opening phase, the numeric control will not make the positioning and will signal this with an alarm.

6.4 Tolerance management

Tolerance management depends on the axis configuration.

6.4.1 "AC" axis

Tolerance checking is only enabled if the “TO” parameter is different from zero.
In this case, the numeric control waits for the tolerance time (axis parameter “£TT”) at the end of positioning, after which it checks whether the axis has ended up beyond the tolerance interval (axis parameter “TO”).

The positioning is repeated infinitely until the axis returns within the tolerance limit.

6.4.2 "DC" axis

Tolerance checking is essential for positioning precision for axes that are not kept torqued.
Positioning only ends when the axis is within tolerance, or when the tolerance timer trips. In this case, an alarm will signal if the axis is beyond the tolerance range.
The timer serves to prevent infinite waits. It is advisable to use a high timer value to obtain the maximum precision.

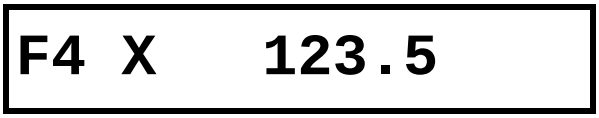
7 Semiautomatic mode

Both axes can be subjected to absolute positionings in this function.

This function cannot be accessed in the following cases:

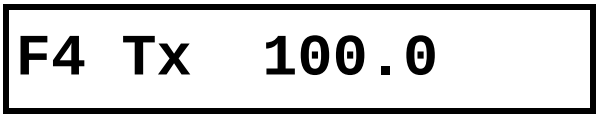
- parameter errors
- both axes disabled

Press **[*F/4*]** from the basic menu to display the current target of “X” axis if this has been configured, otherwise the target of “A” axis will appear:

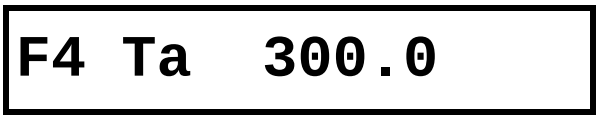


Current “X” axis target

Press **[E]** in succession to switch from the current target of one axis to the other.
Use **[M]** to alternatively display the positioning targets of the two axes given in the utilized unit of measurement.



“X” axis target



“A” axis target

Press **[C]** to enter a new target for the selected axis. Enter the required value and press **[M]** to confirm it.

7.1 Cycle

7.1.1 Operation with single parameter MODE=TYP.1

Axis positioning will start when START is enabled for the axis to be moved, after which the display will switch to the current target of the selected axis.

The END OF POSITIONING signal of the moving axis is deactivated during the positioning phase of either one of the two axes. The signal is re-activated at the end of axis positioning.

7.1.2 Operation with single parameter MODE=TYP.2

Positioning to the target is followed by a further automatic positioning to return to the BASIC position. When “A” axis has reached the established target, the numeric control waits a certain time (parameter “TA”) after which a positioning to the BASIC position (parameter “ZA”) automatically takes place.

Axis positioning will start when START is enabled for the axis to be moved, after which the display will switch to the current target of the selected axis.

The END OF POSITIONING signal of the moving axis is deactivated during the positioning phase of either one of the two axes.

The signal is re-activated for “X” axis at the end of the positioning and for “A” axis only if, at the end of positioning, the axis is in the BASIC position within the tolerance limits (see axis parameter “ZA”).

Warning
If an “A” axis positioning has been interrupted in the Automatic or Semiautomatic modes, only movement in the MANUAL SLOW mode (in the F3-Manual function) will be possible until “A” axis returns to the BASIC position (parameter “ZA”).

8 Semiautomatic mode 2

Both axes can be subjected to absolute positionings in this function.

This function cannot be accessed in the following cases:

- parameter errors
- both axes disabled
- single parameter “MODE=TYP.1”

Press **[*F/8*]** from the basic menu to display the current target of “X” axis if this has been configured, otherwise the target of “A” axis will appear:

Current “X” axis target

The same keys as the ones described for the Semiautomatic function are enabled.

The difference from the Semiautomatic function only concerns the cycle. The Semiautomatic mode includes return to the ZERO position, while in this function it is not possible. Positioning concludes once the set target has been reached. To produce a return to the basic target for the axis, carry out a second positioning setting the “BASIC” value as target.

9 Automatic mode

This function is used to accomplish cycles memorized by means of function F1.

This function cannot be accessed in the following cases:

- parameter errors
- both axes disabled

A message will indicated if there are no cycles memorized:

```
F5 NO CYCLES
```

Press the **[*FUN*]** key in this condition to automatically quit the function.

If there is at least one cycle in the memory, press the **[*F/5*]** key from the basic menu to display the number of the last cycle executed or suspended, for example:

```
F5 CYC N  1
```

To select a different cycle from the one displayed, press **[C]**, enter the required value and confirm it with **[M]**. If the selected cycle does not exist, the numeric control will propose the last one to be executed.

Press **[N]** to scroll through all the cycles that have been written. Confirm the selected one with **[M]**. The end of positioning outputs are deactivated when the cycle is changed with the **[N]** key.

Press **[M]** on the last cycle number to display the number of times the last cycle must still be executed ("cycle counter"). If this value is 0, it means that the cycle has been executed for the same number of times as the programmed value, or more. Once the count has reached zero, it remains at zero even if the cycle is repeated again. The following message may appear on the display:

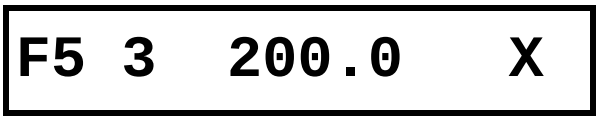
```
F5 RIP  -10
```

Cycle counter

Press **[C]** to change that value (max. 9999) and **[M]** to confirm the newly entered one.

The last program executed is also saved in this function, besides the last cycle. These values can be accessed by pressing **[M]** when the message shown in the figure above appears on the display. Supposing that the last program to have been executed was number 3.

The following display message would appear:

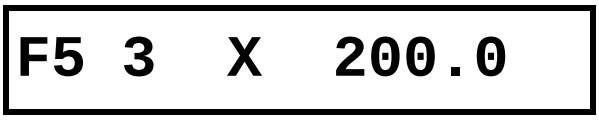


Last cycle step executed

Press **[M]** to alternatively display the two targets (X and A) that form the program.

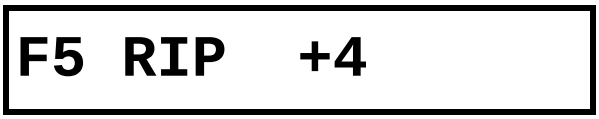
Press **[N]** to scroll through all the programs in the selected cycle. All the targets referring to X axis will be displayed in particular.

Press **[E]** alternately to display the absolute targets of axes X and A. The real target of the axis is displayed in a different way from the set target since the axis reference is moved before the target:



Current axis target in the Automatic mode

Press **[.]** to display the number of times the cycle must still be executed (if the value is preceded by the "-" sign), or the number of times the cycle has been executed over and above the programmed value (if the value is preceded by the "+" sign). For example:



Note that if the cycle is executed more than the programmed number of times (“+” sign), this value will not be memorized and will thus be lost if the automatic function is quitted. If value +0 is displayed when this function is accessed again, it means that that cycle has been executed for the number of times set in the cycle counter, or more.
If another, and not the displayed positioning, is required, press **[*F/6*]** and enter the number of the step to execute (the same procedure as the one described in the "Cycle Reading/Writing" chapter).

9.1 Automatic cycle

Positioning of the axes in the automatic mode in relation to the displayed program, begins when the START inputs of the two axes are activated.

The axes will be controlled either in sequence or simultaneously, depending on how the START inputs are activated. The display will show the number of the program being executed and the absolute target of the axis activated last.

Only if “MODE=TYP.2”: when “A” axis has reached the target established in the current step, the numeric control waits a certain time (parameter “TA”) after which it automatically returns to the BASIC position (BASIC or ZERO position, see axis parameter “ZA”).
If an axis reaches its target before the other, the display will automatically switch to the real target of the axis not yet in position. The last display activated remains visualized at the end of the positioning cycle.

As soon as X axis reaches the programmed position, the END OF POSITIONING input of the axis is activated, similarly for A axis if “MODE=TYP.1”. Otherwise the end of positioning output is only activated for this axis when it has automatically returned to the BASIC position.

The next positioning is accomplished by enabling START again (the END OF POSITIONING outputs are deactivated).

If the program just accomplished by X axis also contains the deviation function ('s'), an incremental forward movement of X axis alone is accomplished once the input of the same name is activated.

The following message appears on the display once the cycle counter reaches zero:

```
F5 END CYCLE
```

Only when the START inputs are activated again will cycle execution be able to continue from the first program.

Warning
Only if “MODE=TYP.2”, and if an “A” axis positioning has been interrupted in the Automatic or Semiautomatic mode, will MANUAL SLOW movement be possible (in the F3-Manual function) until “A” axis returns to the BASIC position (parameter “ZA”).

10 Alarms

The EMERGENCY control and the **[STOP]** key are always activated during axis movement.

10.1 Emergency

If the contact of the EMERGENCY input opens during axis movement, the situation is signalled by the following message (e.g. supposing that a positioning has been interrupted in the Automatic – F5 function):

Alarm display

The EMERGENCY input must be deactivated to quit this condition and be able to use the numeric control again.

If an A axis positioning has been interrupted in the automatic or semiautomatic modes, only movement in the MANUAL SLOW mode will be possible until “A” axis returns to the BASIC position.

10.2 STOP key

The numeric control behaves in the way described above if the operator activates the STOP command. In this case, press **[*FUN*]** to quit the alarm status and use the numeric control again.

11 Test

Various tests can be conducted in this function. Press **[*F/7*]** from the basic menu to access the first of the available tests. These are:

- INPUT TEST
- OUTPUT TEST
- ANALOG TEST
- AXES TEST
- DISPLAY TEST
- KEYBOARD TEST

Use **[C]** to scroll through each of these tests. Press **[M]** to access the selected test.

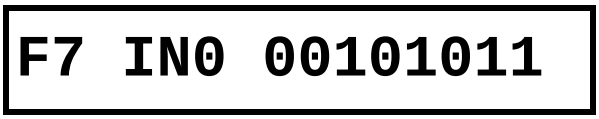
Press **[*FUN*]** to return to the previous level and, thus, to the available test menu when working on the selected test.

Press **[*FUN*]** again to quit the test function.

Warning
The EMERGENCY input monitoring function is disabled on access to the TEST function.

11.1 Input test

Allows the status of each input to be checked for each board configured as inputs. The display will show the code that identifies the inputs and the relative status, represented with characters “0” and “1”:



Input Test

- IN0 = terminal board M2
- 0 = input open
- 1 = input closed
- The first digit displayed on the right is associated with the first pin of the relative terminal board (see description of connections).

11.2 Output test

Allows the function of each digital output to be checked for each board configured as outputs. The display shows the number of the selected board followed by a set of characters that represent the status of the outputs.

```
F7 OUT1 00000000
```

Digital output test

- OUT1 = terminal board M3
- 0 = output deactivated
- 1 = output activated
- The first digit displayed on the left is associated with the first pin of the relative terminal board (see description of connections).

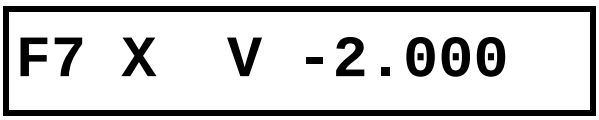
Press keys **[1]** to **[8]** to activate the relative output. The output remains activated if the key is kept depressed. The output will only be deactivated when the key is released. Remember that key **[1]** is associated with the first output of the corresponding terminal board, key **[2]** with the second, and so forth.

Warning
Activation of these outputs could trigger off mechanical movements that could represent a danger for persons and/or the mechanical parts.

Note
The EMERGENCY input monitoring function is disabled on access to the TEST function.

11.3 Analog test

This function can be used to test the analog outputs associated with each axis. The first axis appears on the display along with the voltage to program:



Analog output test

Press **[.]** or **[E]** to select the axis.

Press **[C]** to enter the voltage value. Values between -10,000 and +10,000 Volts are accepted.

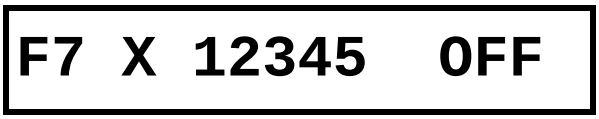
Keep the **[START]** key depressed to enable both the drive and programmed voltage. As soon as the key is released, the analog voltage immediately returns to zero.

Warning
Activation of these outputs could trigger off mechanical movements that could represent a danger for persons and/or the mechanical parts.

Important
The minimum and maximum software limits are disabled whenever an analog voltage is supplied.

11.4 Axes test

This function is used to check the axes count and relative zero mark status. On access to this test, the display will show the first axis along with the relative target in machine pulses followed by the status of the relative zero mark:



Axes test

Press **[.]** or **[E]** to select the axis.

11.5 Display test

Allows the available capital and lower case alphabetical characters to be displayed plus the numeric characters by repeatedly scrolling from right to left:

Display test

Press the **[STOP]** key alternatively to stop or continue scrolling through the characters.

11.6 Keyboard test

Allows the operation of all the keys to be tested.
The following message appears on the display:

Keyboard test

Press any key and it will automatically appear on the display.

12 Sizing.

In this function, the axes can be sized by directly entering the target or by means of a particular dedicated cycle for A axis only.

This function cannot be accessed in the following cases:

- parameter errors
- both axes disabled

Press **[*F/9*]** from the basic menu to display the current target of "X" axis if this has been configured, otherwise the target of "A" axis will appear:

Current "X" axis target

The axis target is given in the utilized unit of measurement.
Press **[E]** in succession to switch from one axis to the other.

12.1 Immediate sizing

Proceed in the following way to enter the sizing target for the selected axis:

- press **[C]** when the current axis target is displayed:

Axis target entry

- enter the required value and press **[M]** to confirm it. If the target is not accepted, it means that it is beyond the minimum and maximum limits (see axis parameters "MX" and "MN") of the axis in question. The entered target is given in the utilized unit of measurement.

12.2 A axis automatic sizing

Press **[START]** at any moment to carry out the automatic sizing process for A axis alone, so long as this has been configured (single parameter TYAX_A different from OFF).

The display switches to that of A axis. The axis is controlled in the Forward or Backward mode (this depends on the value entered for single parameter “MOV_TAR”) in search of the sizing input which is the A FORWARD L.S. or the A BACKWARD L.S., depending on the "MOV_TAR" parameter.

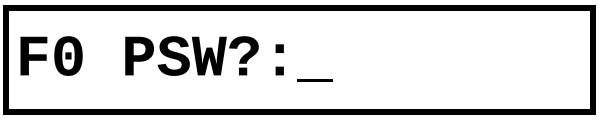
Press START and the axis will move off at sizing speed in the selected direction in search of the limit switch (note that at this time, the two limit switches of the axis act as sizing switches and not limit switches of the axis). Once the input has activated, the axis reverses its direction and will size on release, taking on the preset target entered in the parameters (see parameter "PR").

If A axis is already at the starting point on the sizing limit switch, it will release the input and size itself.

13 Password

The password is a sequence of keys followed by **[M]** to confirm it. Annul the entry by pressing **[*FUN*]**.

The following display message will appear when the password is requested:



Password request

13.1 Password N° 1

[N] [N]] [N] [E] [E] [E]

13.2 Password N° 2

[0] [5] [1] [6] [2] [7]

14 Alarms and Messages

Different types of alarm can occur. They can be divided into "external alarms" generated outside and "internal alarms" generated automatically by the numeric control.

The action generally taken in these cases is generally to brake the axis with an alarm deceleration ramp if it is moving (see relative parameter) or, if the axis is at a standstill, to disable any outputs activated at that moment.

With the exception of the one generated by the EMERGENCY input, all the alarms are reset by solely and exclusively pressing the [STOP] when the alarm itself is displayed.

Important
If the axis is configured as a “DC” axis and if it was TORQUED before the alarm occurred, it will be un-torqued and only torqued again after the reset.

14.1 ALARM: EMERG.

External alarm: the EMERGENCY input is activated.
The EMERGENCY must be deactivated before this type of alarm can be reset.

14.2 ALARM: Op.Stop

External alarm: **[STOP]** has been pressed or the input of the same name (STOP) has been activated during axis movement or during activation of outputs of the impulsive type.

14.3 ALARM: Fw.Ls.

External alarm: the axis is occupying the forward hardware limit. Reset the alarm with the STOP key and move the axis backward in the manual mode.

14.4 ALARM: Bk.Ls.

External alarm: the axis is occupying the backward hardware limit. Reset the alarm with the STOP key and move the axis forward in the manual mode.

14.5 ALARM: Follow

Internal alarm: if the analog reference reaches 10 Volts, the axis sets to the alarm status owing to a follow error. This can be caused by:

- the encoder is broken or not connected;
- the drive is in the alarm status or the motor is blocked;
- the motor is unable to reach the speed that has been set;
- the parameters concerning the dynamics have not been sized correctly.

14.6 ALARM: Min-Max

Internal alarm: the axis has overtravelled the set software limits during its movement, or the required positioning cannot be accomplished as it would end up beyond the limits set.

14.7 ALARM: Out Tol

Internal alarm: The axis has not reached the programmed position within the tolerance range.

14.8 AXES DISAB

This message may appear on access to the Manual, Semiautomatic, Semiautomatic 2, Automatic and Sizing functions if both axes have been disabled (see single parameters “TYAX_X=OFF” and “TYAX_A=OFF”).

14.9 ERR. PARAM

This message may appear when the numeric control is powered or in the operating functions of the numeric control (Manual, Semiautomatic, Automatic and Sizing). It warms that there are errors in the machine (function F0).

14.10 M.Not Sized

This message may appear in the Manual, Semiautomatic and Automatic functions. It warns that the axis must obligatorily be sized in order to be controlled.

15 Description of the digital inputs

- **X AXIS START** (NO contact): On closing, this contact starts X axis positioning in the Automatic and Semiautomatic functions.
- **EMERGENCY** (NC contact): All movement phases immediately stop when this contact opens. The numeric control will accept no START commands if this contact is deactivated.
- **A AXIS START** (NO contact): On closing, this contact starts A axis positioning in the Automatic and Semiautomatic functions.
- **DEVIATION** (NO contact): Closing of this contact in the Automatic function, causes forward positioning of the axis to the target set in axis parameter (X axis) “SC” but only if the Deviation function has been programmed and both axes are positioned.
- **X FORWARD LS.**: (NC contact) This is the forward limit of X axis. It is only controlled when the axis is moving forwards.
- **X BACKWARD LS.**: (NC contact) This is the backward limit of X axis. It is only controlled when the axis is moving backwards.
- **A FORWARD LS.**: (NC contact) This is the forward limit of A axis. It is only controlled when the axis is moving forwards. During the sizing phase, this will be the sizing input of A axis if single parameter "MOV_TAR" is "FWD" (see "Sizing" chapter).
- **A BACKWARD LS.**: (NC contact) This is the backward limit of A axis. It is only controlled when the axis is moving backwards. During the sizing phase, this will be the sizing input of A axis if single parameter "MOV_TAR" is "BACK" (see "Sizing" chapter).

Important
In order to be considered, inputs of the impulsive type must remain in the definite activated status for at least 200 milliseconds.

16 Digital of the digital outputs

- **END OF X POSITIONING**: Normally deactivated. It is activated: in the Manual function, in the Semiautomatic function and in the Automatic function when X axis has reached the programmed position. It is deactivated during the positionings, thus on Start for an axis positioning, on quitting the Manual, Semiautomatic and Automatic functions and when the number of repeats per cycle (cycle counter) has reached zero, in particular with the first START after the last positioning of the cycle has been executed (in the Automatic mode). This output is deactivated if a positioning is interrupted in the Automatic or Semiautomatic functions by means of the EMERGENCY input or the **[STOP]** key, or if an alarm has occurred.
- **END OF A POSITIONING**: Normally deactivated. It is activated: in the Manual function, in the Semiautomatic function and in the Automatic function when A axis has reached the programmed position or the BASIC position (within tolerance limits). It is deactivated during the positionings, thus on Start for an axis positioning, on quitting the Manual, Semiautomatic and Automatic functions and when the number of repeats per cycle (cycle counter) has reached zero, in particular with the first START after the last positioning of the cycle has been executed (in the Automatic mode). This output is deactivated if a positioning is interrupted in the Automatic or Semiautomatic functions by means of the EMERGENCY input or the **[STOP]** key, or if an alarm has occurred.
- **X FAST FORWARD**: If the axis has been configured as AC, this commands a movement of X axis towards increasing values in the fast mode. If the axis has been configured as DC and protected parameter TY is 1 or 2, this output establishes the movement direction of X axis (FORWARDS or BACKWARDS).
- **A FAST FORWARD**: If the axis has been configured as AC, this commands a movement of A axis towards increasing values in the fast mode. If the axis has been configured as DC and protected parameter TY is 1 or 2, this output establishes the movement direction of A axis (FORWARDS or BACKWARDS).
- **X FAST BACK**: Commands a movement of X axis towards zero in the fast mode (only AC axes).
- **X SLOW BACK**: Commands a movement of X axis towards zero in the slow mode (NOTE: in the case of one-speed axis configuration, the output used is always the SLOW BACK one).
- **A FAST BACK**: Commands a movement of A axis towards zero in the fast mode (only AC axes). In the case of a DC axis, this output is used as A axis BRAKE (see X BRAKE).
- **A SLOW BACK**: Commands a movement of A axis towards zero in the slow mode (NOTE: in the case of one-speed axis configuration, the output used is always the SLOW BACK one).

17 Description of the Connections

If the board with two inputs via incremental encoder is mounted, the rear of the numeric control is like the figure below:

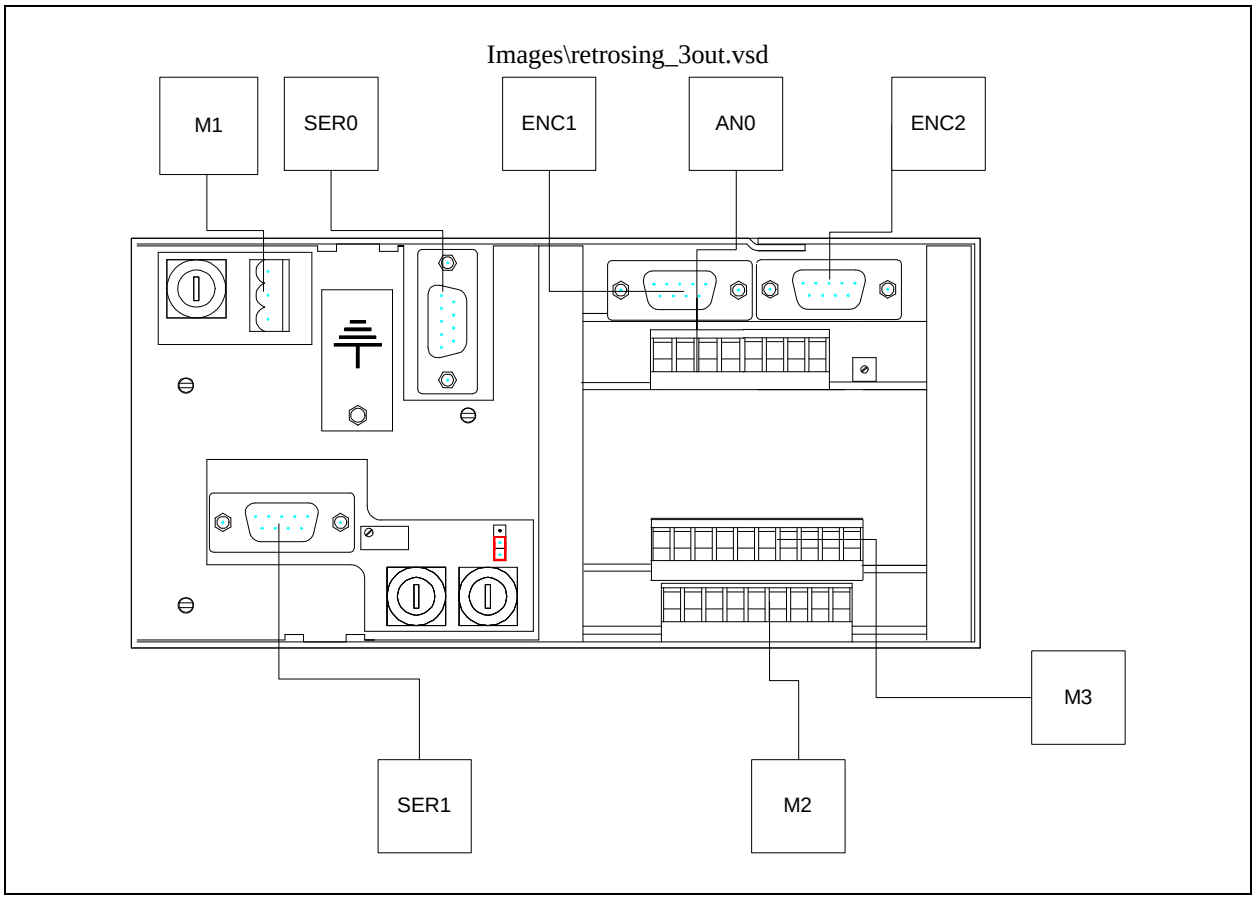


Figure 17.1 - Rear part of the numeric control

otherwise, it will be like the figure below if two encoder boards are mounted:

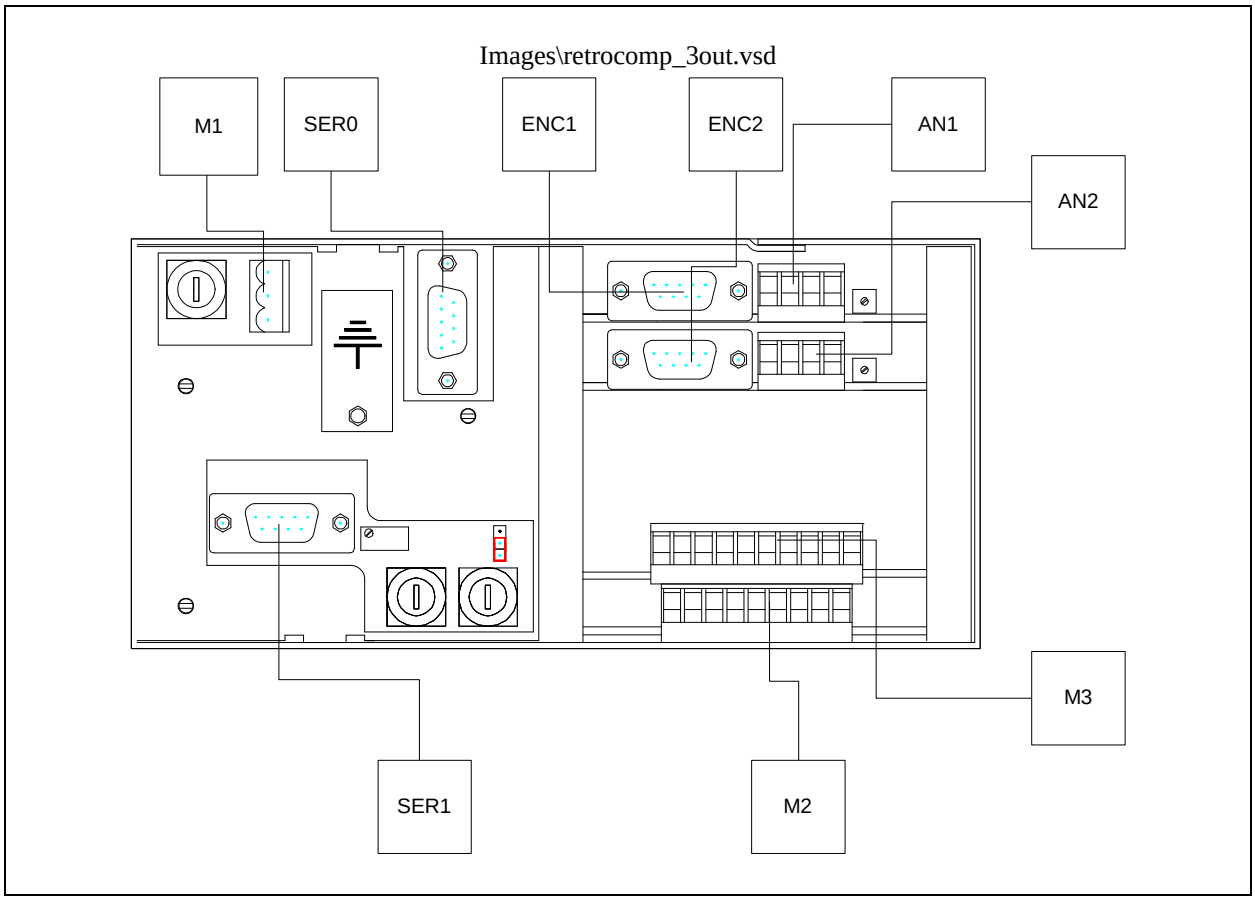


Figure 17.2 - Rear part of the numeric control

17.1 Connectors ENC 1 and ENC 2 (encoder)

1 - GND Shield (braid)
2 - + Ve
3 - - Ve GND
4 - /A
5 - A
6 - /B
7 - /0
8 - 0
9 - B

Remember that:

- ENC 1 = X axis
- ENC 2 = A axis

17.2 Terminal board M1 (Power supply)

Refer to the label affixed to the numeric control for the type of power supply. It may be one of two types:

90-240 Vac, 50 Hz;
24 Vac.

1 – Single-phase line 1
2 - GND Ground
3 – Single-phase line 2

17.3 Terminal board M2 (digital inputs)

1 – X axis start
2 - Emergency
3 – A axis start
4 - Deviation
5 – X axis forward Ls.
6 – X axis back Ls.
7 – A axis forward Ls.
8 – A axis back Ls.
9 - GND

17.4 28.4 Terminal board M3 (digital outputs)

Bear the following connections in mind if this board has RELAY outputs:

1 – X axis end of positioning
2 – X axis end of positioning common contact
3 – A axis end of positioning
4 – A axis end of positioning common contact
5 – X axis Fast Forward
6 – X axis Fast Forward common contact
7 – A axis Fast Forward
8 – A axis Fast Forward common contact
9 – X axis Slow Back
10 – X axis Fast Back and X axis Slow Back common contact
11 – X axis Slow Back
12 – A axis Fast Back
13 – A axis Fast Back and A axis Slow Back common contact
14 – A axis Slow Back

Bear the following connections in mind if this board has TRANSISTOR outputs:

1 – X axis end of positioning
2 – A axis end of positioning
3 – X axis Fast Forward
4 – A axis Fast Forward
5 – X axis Fast Back
6 – X axis Slow Back
7 – A axis Fast Back
8 – A axis Slow Back
9 - +24 Vdc power supply
10 – Common contact

17.5 Terminal board AN0 (+/- 10 Volt analog output)

1 - X (+) axis analog
2 - X (-) axis analog
3 - A (+) axis analog
4 - A (-) axis analog
5 – X axis enabling
6 – X axis enabling common contact
7 – A axis enabling
8 – A axis enabling common contact

17.6 Terminal board AN1 (+/- 10 Volt analog output)

1 - X (+) axis analog
2 - X (-) axis analog
3 – X axis enabling
4 – X axis enabling common contact

17.7 Terminal board AN2 (+/- 10 Volt analog output)

1 - A (+) axis analog
2 - A (-) axis analog
3 – A axis enabling
4 – A axis enabling common contact

END OF CHAPTER

What do you think of this manual ?

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Aspect in question	Excellent	Good	Sufficient	Insufficient	Very bad
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